

## Space Shuttle Propulsion Trivia

NASA fuels discoveries that make the world smarter, healthier, and safer. The **Space Shuttle Main Engine** operates at greater temperature extremes than any mechanical system in common use today. At -423 degrees Fahrenheit, the engine's fuel, liquefied hydrogen, is the second coldest liquid on Earth. When it and the liquid oxygen are combined and combusted, the temperature in the main combustion chamber is 6,000 degrees Fahrenheit, hotter than the boiling point of iron.

The energy released by the three **Space Shuttle Main Engines** at their full power—calculated in watts—is equivalent to the same amount of energy created by 13 Hoover Dams.

The **Space Shuttle Main Engine** fuel turbopump weighs approximately the same as a V-8 automobile engine, but develops 310 times the brake horsepower and develops as much torque as 18 V-8 auto engines. The main shaft of the turbopump rotates at 37,000 rpm—a car operating at 60 mph runs at 2,000 rpm.

One **Space Shuttle Main Engine** generates enough thrust to maintain the flight of 2.5 Boeing 747s.

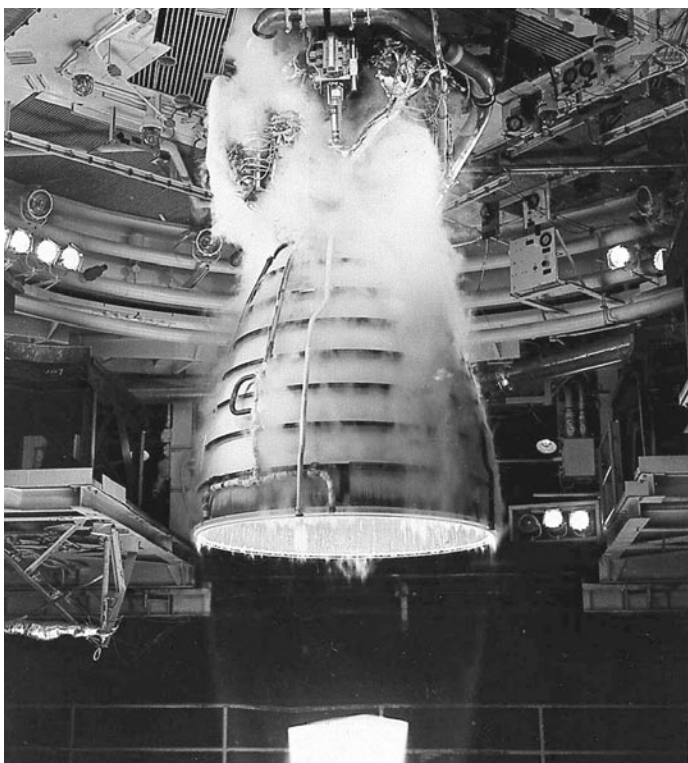
Even though a **Space Shuttle Main Engine** weighs one-seventh as much as a locomotive engine, its high-pressure fuel pump alone delivers as much horsepower as 28 locomotives, while its high-pressure oxidizer pump delivers the equivalent horsepower of an additional 11 locomotives. The maximum equivalent horsepower developed by the three main engines is more than 37 million horsepower.

The combined volume of the **External Tank's** liquid hydrogen and liquid oxygen tanks is 73,600 cubic feet—equal to the volume of nearly six 1,600-square-foot homes.

If all the weld joints in the **External Tank** were laid out in a straight line, they would stretch more than half a mile.

The **External Tank** is covered with a thermal protection system, or foam insulation which, if spread on the ground, would cover nearly one-half acre.





The **External Tank** is more than half the length of a football field and 34 feet longer than Orville Wright's historic first flight in 1903. Despite its size, the aluminum skin of the tank is only an eighth of an inch thick in most areas.

The two **Solid Rocket Boosters** generate a combined thrust of 5.3 million pounds, equivalent to 44 million horsepower or 14,700 six-axle diesel locomotives or 400,000 subcompact cars.



At liftoff, the two **Solid Rocket Boosters** consume 11,000 pounds of fuel per second. That's two million times the rate at which fuel is burned by the average family car.

The twin **Solid Rocket Boosters** generate a combined thrust of 5.3 million pounds. That equals about 40 million horsepower or the energy of 14,700 six-axle diesel locomotives or 400,000 subcompact cars.

At 149.2 feet tall, the **Solid Rocket Booster** is only two feet shorter than the Statue of Liberty. But each 700-ton loaded booster weighs more than three times as much as the famous statue.

For more information, visit <http://www.nasa.gov>.



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